

US-PAT-NO: 4902370
DOCUMENT-IDENTIFIER: US 4902370 A
TITLE: Synthetic based cold seal adhesives

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The polymers selected for the base and secondary polymers are selected from a wide array of synthetic polymers, copolymers, and polymer mixtures, including acrylic copolymers and styrene butadiene rubbers (SBR's) as base polymers and styrene-acrylic copolymers as secondary polymers. Thus, the instant invention permits the use of synthetic materials in applications in which natural latex rubber was previously the only useful polymer. An additional benefit of the use of synthetic polymers is that the adhesive will be characterized by lower odor, longer shelf life, greater mechanical stability, and lower foaming than its natural polymer counterpart.

The soft polymers comprise the base polymer composition and are characterized by a Tg of -40.degree. to -60.degree. C., preferably -50.degree. to -60.degree. C., more preferably -54.degree. C., and a Williams plasticity number of 2.5 to 2.9 preferably 2.7. Thus these polymers are quite tacky and impart a high degree of pressure sensitivity to the adhesives. Virtually any synthetic polymer meeting these criteria can be used in the adhesive compositions of this invention, but preferred polymers include acrylic copolymers such as a copolymer comprising 60% (by wt.) butyl acrylate, 30% (by wt.) 2-ethylhexyl acrylate, and 10% vinyl acetate;

and styrene butadiene rubbers. Additionally, mixtures of polymers can also be employed in this capacity, with the main criterion for selection being the Tg and plasticity number of the overall mixture; thus, it is not essential that each polymeric component have the requisite properties, only that the polymer mixture possess them. Additionally, in some cases (e.g. with certain acrylic copolymers) it may be necessary to crosslink the polymers to bring its plasticity number to an acceptable level.

The hard polymers and/or resins comprise the secondary polymer composition and are characterized by a Tg of -25.degree. to +5.degree. C., preferably -15.degree. to 0.degree. C., more preferably -10.degree. C. and a Williams plasticity number of 5.0 to 5.6, preferably 5.0 to 5.3, more preferably 5.1. Thus these polymers reduce the overall tack and pressure sensitivity of the adhesive composition, permitting its use as a cold seal adhesive. Any polymer meeting these criteria is useful as in the compositions of this invention, but preferred polymers include styrene-acrylic and ethylene vinyl acetate copolymers. Also, as was the case with the soft polymers, mixtures of hard polymeric or hard resin components may also be employed so long as the Tg and plasticity number fall within the acceptable range.

The adhesive compositions may also contain minor (<1% by wt.) amounts of optional materials which serve to augment certain desirable properties of the system. These materials include commercially available antifoaming compounds such as Bevaloid 6681 to 6603, which can be present in an amount ranging from about 0.1 to about 0.5% (by wt.); wetting agents such as sulfosuccinates (e.g.

Aerosol MA 80), which can be present in an amount ranging from about 0.2 to about 0.6% (by wt.); and antiblocking agents, such as Aquacer 608, which can be present in an amount up to about 0.5% (by wt.). The compositions listed are given by way of example only; virtually any compound having the desirable properties can be employed in this regard so long as it is compatible with the polymer mixture.

Based on the blocking peel value and a subjective visual inspection of the surfaces after this determination, the probability of observing blocking was determined. This was rated on a scale of 1-5. Generally, a value of 4 or less is acceptable for cold seal adhesives.

US-PAT-NO: 5278451

DOCUMENT-IDENTIFIER: US 5278451 A

TITLE: Semiconductor device sealed with
mold resin

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Referring to FIGS. 4C and 4D, using the photoresist 7 as a mask, organo-silicone polymer film 106 is etched using 1, 1, 1-trichloroethane. Next, removing photoresist 7, a thermal treatment is applied at 350.degree. C. for one hour to make a cross linked ladder type organo-silicone polymer film 106.

Referring to FIGS. 4E and 4F, using photoresist 7 as a mask, aluminum evaporating film 15 is etched, and removing photoresist 7 subsequently, an aluminum electrode 4 is formed.

In the inspection of volatility defective of transistors of semiconductor devices manufactured in this way, the fraction defective was 0%.

Heat shocks (H/S) of -196.degree. C. and 260.degree. C. are applied for one hour at respective temperatures, which was repeated for 500 times. Opening the semiconductor for the inspection inside, no abnormality was found.

For comparison with the semiconductor device obtained by the example 1, a semiconductor device having no stress buffering film at all and a semiconductor device in which an organo-silicone ladder polymer film 6 expressed by the

formula (1) is provided having a film thickness of 2. μ m are prepared. These two kinds of comparative samples were manufactured under the same conditions as those in the example 1 except the organo-silicone ladder polymer film. In the inspection of the fraction defective of the two kinds of transistors, it is revealed that the semiconductor device having no organo-silicone ladder polymer film has fraction defective of 5%. The semiconductor device having an organo-silicone ladder polymer with a film thickness of 2. μ m has 3% of defectives. This comparative test clearly showed that an organo-silicone ladder polymer film shown by the formula (1) is preferably formed having a film thickness of 4. μ m or more. In another experiment, it is shown that the film thickness is preferably formed 10. μ m or less.

For comparison with the semiconductor device obtained by the example 1, a semiconductor device (a comparative sample 2) is prepared which includes alkali metal, iron, lead, copper and hydrogen halogenide of 10ppm, respectively, and is expressed by the formula (1). Other forming conditions were the same as those in the example 1. A pressure cooker test has been performed for the comparative sample 2 and then the sealing resin is opened for an inspection inside, then, corrosion of aluminum was found in an opening of a bonding pad.

Organo-silicone ladder polymer shown by the formula (1) having the weight-average molecular weight of 70,000 was prepared. For obtaining a film having a film thickness of 4. μ m by spin-coating the polymer on a semiconductor substrate, the solvent concentration should be necessarily 35 weight % or more. After the spin-coat, applying a thermal treatment at

350.degree. C., cracks are caused in the film. Also, the film thickness was not uniform.

| L Number | Hits | Search Text | DB | Time stamp |
|----------|------|--|---|------------------|
| 1 | 16 | 356/601 and surface near inspection | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:23 |
| 2 | 1 | (356/601 and surface near inspection) and polymer | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:13 |
| 3 | 267 | surface near inspection and polymer | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:24 |
| 4 | 0 | surface near inspection and polymerized near polymer | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:25 |
| 5 | 5 | surface near inspection and polymer near mixture | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:29 |
| 6 | 0 | polymer near surface near inspection | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:31 |
| 7 | 0 | surface near inspection and ((applying and removing) near5 polymer) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:32 |
| 8 | 0 | ((applying and removing and processing) near5 polymer) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:33 |
| 9 | 27 | polymer near coating and surface near inspection | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:34 |
| 10 | 3823 | (coat\$3 near polymer) near6 (substrate or article) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:35 |
| 12 | 6 | ((coat\$3 near polymer) near6 (substrate or article)) and removing and surface near inspection | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:36 |
| 13 | 1 | | USPAT | 2003/05/09 12:39 |
| 11 | 39 | ((coat\$3 near polymer) near6 (substrate or article)) and removing and inspection | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 12:40 |

US-PAT-NO: 5258705

DOCUMENT-IDENTIFIER: US 5258705 A

TITLE: Active matrix substrate inspecting device

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Alternatively, the active matrix substrate inspecting device comprises a transparent conductive film formed on a transparent insulating substrate; a polymer dispersion-type liquid crystal layer formed on the conductive film; and a polymer sheet formed on the liquid crystal layer.

According to another aspect of the present invention, there is provided a method for inspecting any fault in an active matrix substrate, which comprises the steps of disposing an inspecting active matrix substrate opposite a polymer sheet of an inspecting device, applying a voltage across a pixel on the active matrix substrate and a transparent conductive film formed on the active matrix substrate, and inspecting electrical modulation occurring in the liquid crystal layer.

Alternatively, the method for inspecting an active matrix substrate for any fault, comprises the steps of disposing an active matrix substrate opposite a photoconductive polymer sheet of an inspecting device, applying a voltage across a pixel electrode on the active matrix substrate and a transparent conductive film formed on the active matrix substrate, and inspecting electrical modulation occurring in the liquid crystal layer.

Alternatively, the method for inspecting an fault in an active matrix substrate by use of any active matrix substrate inspecting device including a transparent conductive film on a transparent insulating substrate, a polymer dispersion-type liquid crystal on the conductive film, and a polymer sheet on the liquid crystal layer, the method comprises the steps of disposing the active matrix substrate inspecting device such that the liquid crystal thereof is located opposite an active matrix element formed thereon; applying a voltage across a pixel electrode formed on the active matrix substrate and the conductive film of the active matrix substrate inspecting device; and inspecting the rate of change of optical characteristics in the liquid crystal layer of the active matrix substrate inspecting device.

In a preferred embodiment, the polymer sheet of the active matrix substrate inspecting device becomes photoconductive by exposure to visible light irradiation.

As shown in FIG. 1, an active matrix substrate 45 is disposed opposite to the polymer sheet 5 of the active matrix substrate inspecting device. The active matrix substrate 45 shown in FIG. 7 is used. The polymer sheet 5 of the inspecting device 20 can be kept in contact with the active matrix substrate 45 or have a predetermined distance from the active matrix substrate 45 which is less than 100 μm . If the distance is more than 100 μm , a sufficient voltage cannot be applied to the liquid crystal layer. Polarization elements 21 and 22 are provided on the outer surface of the inspecting device 20 and the active matrix substrate 45. Instead of the polarization elements 21 and 22,

polarization plates maybe used. The polarization elements 21 and 22 are disposed such that the polarizing axes are 90.degree. or 0.degree. to each other.

11. An active matrix substrate inspecting device according to claim 1, wherein said polymer sheet of said inspection unit is spaced a predetermined distance from said active matrix substrate.

14. An active matrix substrate inspecting device according to claim 1, wherein said polymer dispersion-type liquid crystal layer is formed using a mixture of UV polymeric compound and liquid crystal solidified by UV light.

17. An active matrix substrate inspecting device according to claim 1, wherein the polymer sheet is formed by extending a photoconductive high molecular compound comprising a mixture of an aromatic heterocyclic compound and polycyclic aromatic hydrocarbon.

19. An active matrix substrate inspecting device according to claim 1, wherein the polymer sheet is formed by extending a photoconductive high molecular compound comprising a mixture of an aromatic heterocyclic compound and photoconductive radical.

US-PAT-NO: 4971895

DOCUMENT-IDENTIFIER: US 4971895 A

TITLE: Double exposure method of
photoprinting with liquid
photopolymers

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Salvaging reject printed wiring boards in the production process is readily done in this invention by controlling the amount of radiating energy, as may be seen from the FIG. 5 inspection station 59. Before a post inspection cure step more thoroughly bonding the polymer to the substrate is applied either in the process steps or as a separate bonding step at a later time, the polymer may be radiated just enough to bond the layer to the substrate enough that it may be stripped without damage to an expensive circuit board thereunder. Typically the post cure could comprise a longer time in the light tunnel after inspection, where defective boards could be removed for salvage and rework.

| L Number | Hits | Search Text | DB | Time stamp |
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| 1 | 0 | "6451141" and inspect | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 14:16 |
| 2 | 44 | polymer near mixture and 356/\$.ccls. | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 14:31 |
| 3 | 8 | "5711839" | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 14:31 |
| 4 | 0 | "5711839" and inspect\$3 | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 14:31 |
| 5 | 0 | "6045977" and inspect | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 14:31 |
| 6 | 0 | "6045977" and inspection | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 14:32 |
| 7 | 0 | "6451141" and inspect\$3 | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 14:33 |
| 8 | 12 | inspect\$3 near9 (polymer near4 substrate) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2003/05/09 14:34 |

US-PAT-NO: 4651011

DOCUMENT-IDENTIFIER: US 4651011 A

TITLE: Non-destructive method for
determining the extent of
cure of a polymer

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4651011

US 4651011 A

A major concern in the manufacture of high density multilayer printed wiring boards employing a thin photodefinable polymeric dielectric film to separate conductive layers is the ability to inspect the board prior to operations such as lamination, circuit formation and solder mask application to insure uniformity from board to board and to insure the proper degree of cure has been attained. Conductive paths in the various layers are selectively interconnected by photodefined microvias in the dielectric. The degree of cure achieved in these photodefinable dielectric layers is critical to the proper operation of the multilayer printed circuit board. Also, the ability to successfully inspect the degree of cure of the photodefinable polymer layers used in such boards allows for processing and/or repair schemes which can result in increased product yields.

Generally, we have demonstrated that a fluorescent material such as a fluorescent dye dissolved in a monomer, oligomer or polymer can be used to monitor, non-destructively, the degree of cure or

polymerization via the fluorescence anisotropy (A) or polarization (p) of the fluorophore by means of an optical inspection system. Further, the system can be used to control the means for and hence, degree of polymerization. Such a scheme is particularly useful for monitoring the cure of a polymer film on a printed circuit board. It should be understood, however, that its use is not so limited and it is, in fact, applicable to determine and/or control the degree of polymerization for any polymer in any environment. It is, however, especially suitable for polymer films. The method is based upon the relationship of the measure of the relative restriction of the fluorophore's rotational motion caused by the changes in the surrounding polymer matrix as curing of the polymer proceeds. As the polymeric material cures, the crosslink density increases resulting in a tighter matrix which restricts the motions of the fluorophore. Loss of rotational freedom will cause an increase in the fluorescence polarization value of the excited fluorophore that will approach its limiting value (p.sub.o) as its motion becomes more restricted during the lifetime (.tau.) of its fluorescent state. When coupled with automatic comparators in a feedback system, as shown in FIG. 1, an on-line evaluation and control of the surface of organic polymeric coatings can be obtained regardless of the substrate used.

US-PAT-NO: 6020098

DOCUMENT-IDENTIFIER: US 6020098 A

See image for Certificate of Correction

TITLE: Temporary image receptor and means
for chemical modification of release surfaces on a
temporary image receptor

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Suitable binder resins for the organic photoconductor materials include, but are not limited to, polyesters, polyvinyl acetate, polyvinyl chloride, polyvinylidene chloride, polycarbonates, polyvinyl butyral, polyvinyl acetoacetal, polyvinyl formal, polyacrylonitrile, polyacrylates such as polymethyl methacrylate, polyvinyl carbazoles, copolymers of monomers used in the above-mentioned polymers, vinyl chloride/vinyl acetate/vinyl alcohol terpolymers, vinyl chloride/vinyl acetate/maleic acid terpolymers, ethylene/vinyl acetate copolymers, vinyl chloride/vinylidene chloride copolymers, cellulose polymers and mixtures thereof.

Suitable solvents used in coating the organic photoconductor materials include, for example, nitrobenzene, chlorobenzene, dichlorobenzene, trichloroethylene, tetrahydrofuran, and the like.

One print was first made on the printing apparatus with the drying mechanism disengaged to allow for visual inspection of the dewetting (i.e. beading) of the toner carrier fluid on the photoconductor release surface. Toner carrier

liquid beading is generally undesirable in multicolor liquid electrophotographic imaging processes since it may result in fluid "lenses" on the photoconductor surface which may interfere with subsequent latent image generation steps that make use of actinic radiation to discharge the photoconductor in areas to be imaged. The printing process was completed with the non-dried, film formed image being transferred from the photoconductor to paper via the intermediate transfer roll. Failure to transfer 100% of the image to the intermediate transfer roll was designated T1 transfer failure. This T1 transfer failure was graded by observing the amount of toner that could be transferred off of the photoconductor to a clean sheet of paper (i.e., the clean up sheet). This process was repeated with a drying roll engaged to evaluate T1 failure in that printing configuration.

To evaluate the release in multiple use applications, a series was run consisting of ten consecutive prints followed by one clean up sheet. This was repeated for each printer configuration. A final electrostatic test was performed after the last clean up sheet. The offset of small sections of dried toner image from the photoconductor to the drying roll (i.e. drying roll picking) was also graded by cleaning the regeneration rolls and inspecting for residual toner. The liquid toner in the developer unit was changed after every three release material evaluations.

Transfer was graded by a visual standard method rating system (VSM). The VSM graded the effectiveness of image transfer by a visual inspection of the residual toner left on the transfer medium after transfer and by inspection of the receptor medium for transfer image quality, uniformity

of color and presence of defects. Transfer was rated on a scale of 4.0-10.0, with 10.0 representing perfect transfer. A minimum rating of 8.5 was required for acceptable transfer. Transfer efficiency is a function of laminator speed, with 0.46 meters per minute used for standard product transfer. For the purpose of these tests, higher laminator speeds of 0.61 and 1.8 meters per minute were used. Image transfer performance was rated against a 3M Scotchprint.TM. Electronic Image Transfer Media (8601) which was solvent coated with silicone urea release formulation, as described in U.S. Pat. No. 5,045,391.